

# 8.6

## Area of Trapezoids

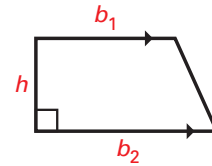
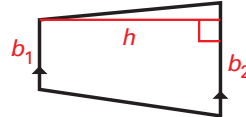
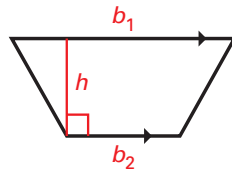
**Goal** Find the area of trapezoids.

### VOCABULARY

**Height of a trapezoid** The shortest distance between the bases of a trapezoid is the height of the trapezoid.

### Follow-Up

For each trapezoid below, label the bases  $b_1$  and  $b_2$ . Then label (and draw if necessary) the height  $h$ .



Complete each statement with *always*, *sometimes*, or *never*.

The bases of a trapezoid are always parallel.

The bases of a trapezoid are never congruent.

The bases of a trapezoid are always sides of the trapezoid.

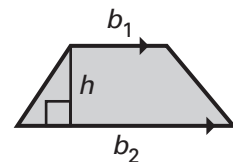
The height of a trapezoid is sometimes a side of the trapezoid.

The height of a trapezoid is always perpendicular to both bases.

### AREA OF A TRAPEZOID

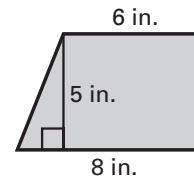
**Words** The area of a trapezoid is one half the product of the height and the sum of the bases.

**Symbols**  $A = \frac{1}{2}h(b_1 + b_2)$



**Example 1****Find the Area of a Trapezoid**

Find the area of the trapezoid.

**Solution**

$$A = \frac{1}{2}h(b_1 + b_2)$$

Formula for the area of a trapezoid

$$= \frac{1}{2}(\underline{5})(\underline{6} + \underline{8})$$

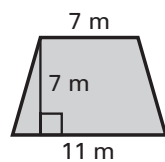
Substitute 5 for  $h$ , 6 for  $b_1$ , and 8 for  $b_2$ .

$$= \frac{1}{2}(\underline{5})(\underline{14})$$

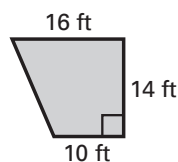
Simplify within parentheses.

$$= \underline{35}$$

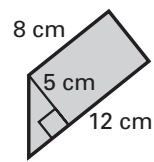
Simplify.

Answer The area of the trapezoid is 35 square inches.**✓ Checkpoint Find the area of the trapezoid.****1.**

$$63 \text{ m}^2$$

**2.**

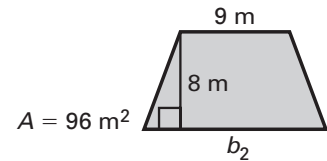
$$182 \text{ ft}^2$$

**3.**

$$50 \text{ cm}^2$$

**Example 2** Use the Area of a Trapezoid

Find the value of  $b_2$ , given that the area of the trapezoid is 96 square meters.

**Solution**

$$A = \frac{1}{2}h(b_1 + b_2)$$

Formula for the area of a trapezoid

$$96 = \frac{1}{2}(\underline{8})(\underline{9} + b_2)$$

Substitute 96 for  $A$ , 8 for  $h$ , and 9 for  $b_1$ .

$$192 = (\underline{8})(\underline{9} + b_2)$$

Multiply each side by 2.

$$192 = \underline{72} + \underline{8}b_2$$

Use the distributive property.

$$\underline{120} = \underline{8}b_2$$

Subtract 72 from each side.

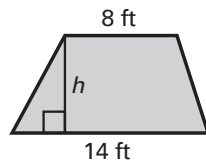
$$\underline{15} = b_2$$

Divide each side by 8.

**Answer** The value of  $b_2$  is 15 meters.

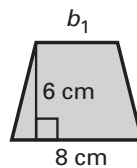
✓ **Checkpoint** In Exercises 4–6,  $A$  gives the area of the trapezoid. Find the missing measure.

4.  $A = 77 \text{ ft}^2$



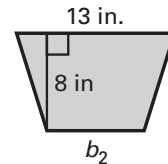
$$h = 7 \text{ ft}$$

5.  $A = 39 \text{ cm}^2$



$$b_1 = 5 \text{ cm}$$

6.  $A = 84 \text{ in.}^2$

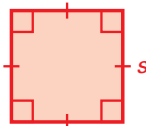
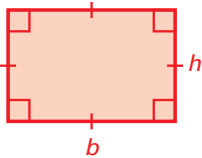
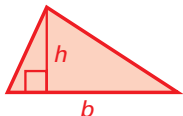
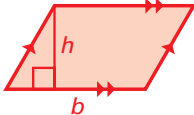
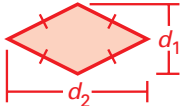


$$b_2 = 8 \text{ in.}$$

7. A trapezoid has an area of 294 square yards. Its height is 14 yards and the length of one base is 30 yards. Find the length of the other base.

$$12 \text{ yards}$$

**Follow-Up** Summarize the area formulas you have learned in this chapter. Write the formula, then draw and label a diagram.

Polygon	Area Formula	Diagram
Square	$A = s^2$	
Rectangle	$A = bh$	
Triangle	$A = \frac{1}{2}bh$	
Parallelogram	$A = bh$	
Rhombus	$A = \frac{1}{2}d_1d_2$	
Trapezoid	$A = \frac{1}{2}h(b_1 + b_2)$	